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# The Effect of Modality Preference on Reading and Listening Comprehension

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THE EFFECT OF MODALITY PREFERENCE ON  
READING AND LISTENING COMPREHENSION

THESIS

Submitted to the Graduate Committee of the  
Department of Curriculum and Instruction  
Faculty of Education  
State University College at Brockport  
in Partial Fulfillment of the  
Requirements for the Degree of  
Master of Science in Education

by

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### Abstract

The effect of modality preference on the reading and listening comprehension of fifty-three fourth graders was studied by comparing the results from two modality preference tests with the scores from reading and listening tasks, which included multiple-choice questions on the literal and inferential levels. Data indicated that modality preference did not affect reading and listening comprehension, and there was no difference in the scores of the four modality preference groups when reading and listening. On the literal level, listening scores were better than reading scores; there were no differences on the inferential level and the total of literal and inferential level. Students and their teachers were not aware of slight differences in reading and listening performance.

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## Chapter I

### STATEMENT OF THE PROBLEM

Throughout the history of education many factors have been studied in attempt to understand and facilitate the learning process. Preference of individuals to learn best when information is presented through a particular sensory channel or mode is one of these factors. Modality preferences may include a preference toward the visual, auditory, kinesthetic, or a combination of any of these modes. When an individual shows a preference to a particular mode, this does not mean that he cannot learn effectively through other sensory channels. It means that one channel has been developed to a greater extent. In fact, a great deal of learning takes place by way of modes other than the preferred one. This concept has many implications in education today.

#### Purpose

The purpose of this study is to investigate the correlation between modality preferences of average and slightly above average students and the comprehension of reading and listening materials on a literal and inferential basis. Modality preferences will be



determined by performance on auditory and visual learning memory tasks.

In most classrooms, children are presented with information to comprehend and recall through multiple modes. It seems obvious that a great deal of learning takes place through all modes. This study will seek to determine whether instruction with regard for modality preference actually provides optimum learning conditions. It will examine whether children can comprehend and recall equally well information presented through preferred and nonpreferred modes. Also, it will determine whether comprehension on a literal level is equal to comprehension on an inferential level when material is presented through preferred and nonpreferred modes. This information will give classroom teachers further insight into the learning process and enable them to provide children with more effective instruction.

#### Questions to be Answered

Answers to the following questions are sought:

1. Among the selected students, is there any modality which is preferred more than others?
2. Among the selected students with a preference toward the visual mode:
  - a. Is literal comprehension best when reading or listening?
  - b. Is inferential comprehension best when

reading or listening?

- c. Is the total of literal and inferential comprehension best when reading or listening?

3. Among selected students with preference toward the auditory mode:

- a. Is literal comprehension best when reading or listening?
- b. Is inferential comprehension best when reading or listening?
- c. Is the total of literal and inferential comprehension best when reading or listening?

4. Among selected students with a preference toward the combination auditory-visual mode:

- a. Is literal comprehension best when reading or listening?
- b. Is inferential comprehension best when reading or listening?
- c. Is the total of literal and inferential comprehension best when reading or listening?

5. Among students selected with no modality preference apparent:

- a. Is literal comprehension best when reading or listening?
- b. Is inferential comprehension best when reading or listening?
- c. Is the total of literal and inferential comprehension best when reading or listening?

6. When listening, among visual learners, auditory learners, combination auditory-visual learners, or those with no preference:

- a. Is literal comprehension best?
- b. Is inferential comprehension best?
- c. Is the total of literal and inferential comprehension best?

7. When reading, among visual learners, auditory learners, combination auditory-visual learners, or those with no preference:

- a. Is literal comprehension best?
- b. Is inferential comprehension best?
- c. Is the total of literal and inferential comprehension best?

8. Are the selected students aware of whether they perform best when reading, listening, or equally well when reading or listening?

9. Are the observations of the teachers of the selected students, concerning preferences toward reading, listening, or both, consistent with results of this study?

#### Need for the Study

Results of research on modality preferences have taken many directions. Two major areas of study exist.

The first concern of research has been the existence of a preferred mode of presentation. Since in most learning situations the modality preference of the

learner is not apparent, certain studies have dealt solely with the effectiveness of the mode of presentation and the amount of learning which has taken place. Studies of May and Hutt (1974) and Huizenga and Estes (1974) have suggested the superiority of the visual mode, while the studies of Bateman (1968) and Markart (1974) suggested the superiority of the auditory mode. Numerous other studies have shown a combined audio-visual presentation to be best--Munsterberg (1894), Hartman (1961), Jester and Travers (1966), Bursuk (1971), and Wepman (1971), while others have shown that a visual presentation is as effective as a combination audio-visual presentation--Lockard and Sidowski (1961), Horowitz (1969), Bruinink and Clark (1970), Fillmer and Lindner (1970), and Walker (1974). Still other studies contend that there is no superior mode of presentation--Bruinink (1968), Ringler, Smith, and Cullinan (1971), Kroll (1973), and McCracken (1974).

The second area of study involves whether learning is facilitated when information is presented by way of the preferred mode. Among works which support this theory are those by Dechant (1966), Kalin and McAvoy (1973), Lilly and Kelleher (1973), and Daniel and Tacker (1973). It is the contention of these works that when modality preferences of individuals are determined, instruction should be based on these preferences so that the maximum amount of learning can take place.

Many researchers present the opposite view by

stating that effective learning can take place when information is presented by way of either the preferred or nonpreferred mode. Learning stimulus presented through the preferred mode does not always provide the best learning experience according to this viewpoint. Responding to an external stimulus is only part of the learning process. Supporters of this position include Many (1965), Bateman (1968), Ringler, Smith and Cullinan (1971), and Broski (1974).

Several factors, such as age, material presented, previous experience with materials, intelligence, achievement, background of experience, and emotional conditions, may account for inconsistencies in previous research. From the review of the literature it can be concluded that:

1. Modality preferences do exist.
2. Material presented by way of the preferred or nonpreferred mode results in a learning situation.
3. The effectiveness of the mode of presentation depends on many variables.

Recognizing that modality preferences may effect learning, but that effective learning does not always take place by presentation of stimulus through the preferred mode, it is the objective of this study to determine conditions which provide an optimum learning situation for the selected students. By using simulated



classroom conditions, the results will have instructional implications which much of the previous research has lacked. Also, this study will not only explore the relationship of modality preference to reading and listening comprehension, but the degree of comprehension--literal and inferential--in relationship to preferred and nonpreferred modalities. This aspect of modality preference has not been considered in recent literature. Finally, reaction of the children and their teachers to modality preferences will provide additional data for classroom implications.

Even though this study will not resolve the controversy surrounding the effects of the modality preferences on learning, it will investigate both areas of consideration--whether information presented by way of the preferred mode facilitates learning, and whether there is a preferred mode of presentation for a selected group.

### Definition of Terms

A mode is a sensory channel, such as vision, hearing, and touch, through which information can be transmitted, received, and processed for learning.

A modality preference is a sensory channel through which an individual has the greatest tendency to learn. In this study, modality preference will be determined by the performance on the auditory and visual learning

memory tasks of the Revised Baxter Test and the Ladd Informal Test of Learning Modalities.

An auditory preference is the tendency to learn best when information is presented for listening, as indicated by a better performance on the auditory learning memory tasks than the visual learning memory tasks of the Revised Baxter Test and the Ladd Informal Test of Learning Modalities.

A visual preference is the tendency to learn best when information is presented visually, as indicated by a better performance on the visual learning memory tasks than the auditory learning memory tasks of the Revised Baxter Test and Ladd Informal Test of Learning Modalities.

A combination auditory-visual preference is the tendency to learn equally well or nearly equally well when information is presented visually or auditorily. A preference toward different modes may be indicated by different modality tests (the Revised Baxter Test and the Ladd Informal Test of Learning Modalities) however, scores on the auditory and visual subtests do not vary more than one point within each test.

No preference toward any modality means that the modality preference cannot be determined by the learning memory tasks of the Revised Baxter Test and the Ladd Informal Test of Learning Modalities because scores on one test show a strength toward one mode and a weakness toward another mode, while the scores on the other test indicate opposite results.



Literal comprehension "focuses on ideas and information which are explicitly stated in the selection. Purposes for reading and teacher's questions designed to elicit responses at this level, may range from simple to complex. A simple task in literal comprehension may be recognition or recall of a single fact or incident. A more complex task might be the recognition or recall of a series of facts or the sequencing of incidents in the reading selection." (Barrett, 1968, p. 19)

Inferential comprehension "is demonstrated by the student when he uses the ideas and information explicitly stated in the selection, his intuition, and his personal experiences as a basis for conjectures and hypotheses. Inferences drawn by the student may be either convergent or divergent in nature, and the student may or may not be asked to verbalize the rationale underlying his inferences. In general, then, inferential comprehension is stimulated by purpose for reading and teacher's questions which demand thinking and imagination that go beyond the printed page." (Barrett, 1968, p. 20)

#### Limitations of the Study

The results of this investigation of the effects of modality preference on reading and listening comprehension are limited to a fourth grade population in one middle to upper middle class suburban school. Students selected for the study have average to slightly above average intelligence on the basis of the Otis-Lennon

Intelligence Test scores, and are reading on and slightly above a fourth grade level according to results on the Iowa Achievement Tests (stanines 4-7). Conclusions drawn from this study cannot be generalized to all fourth graders, but only to the population cited or a matching population.

Modality preference data is limited to scores obtained on the Revised Baxter Test and the Ladd Informal Test of Learning Modalities, which provide auditory and visual learning memory tasks. Scores during one testing session were considered.

Reading and listening comprehension scores are limited to the six selected passages and forty-eight multiple choice questions. Two sessions were provided: one for listening and one for reading.

Finally, all data of this study is indicative of small group performance; there were five or six members in each group. Individual testing was not considered.

### Summary

Modality preference involves the tendency of the individual to learn best through a particular sensory channel--auditory, visual, kinesthetic, or a combination of modes. Since all learning does not take place through the preferred mode, many studies have been concerned with whether information presented by way of the preferred mode actually provides the best learning situation. Results have been conflicting.

It is the purpose of this study to investigate the effects of modality preference on reading and listening comprehension, including literal, inferential, and the total of literal and inferential comprehension. The sample consists of fourth grade students of average to slightly above average intelligence and reading level. Three small group testing sessions (modality, reading, and listening testing) were used to collect data for this study.

## Chapter II

### REVIEW OF THE LITERATURE

The effects of modality preference on reading and listening comprehension were examined in this study. In the past a great deal of research has considered learning modalities. First, mode of presentation has been studied to determine if any mode facilitates learning more than the others. Second, research has examined whether the modality preference of the learner should be considered when presenting learning stimuli. Many variables, including characteristics of the subjects, environment, and materials, have affected the results of previous studies.

#### Mode of Presentation

There are many opinions concerning the existence of a preferred mode of presentation. Under varying circumstances, differing modes have been found to be more effective than the others for a particular group. There is no mode which consistently produces the greatest amount of learning.

#### Auditory Mode

McGeoch and Irion (1952) and Witty and Sizemore (1959)

reviewed the literature on modalities. Both surveys suggest that an auditory presentation of learning materials is superior to a visual presentation when working with young children. Bateman (1968) and Markart's (1974) findings are consistent with this viewpoint.

Bateman (1968) divided first grade children into modality preference groups, and then exposed them to visual and auditory instruction. She found the auditory instruction to be more effective for all modality groups in reading and spelling.

Another study with primary children was done by Markart (1974). Among second graders, the lowest third in reading and intelligence did significantly better in listening comprehension than reading comprehension, suggesting that low students will benefit from auditory activities.

Swalm (1972) had results similar to Markart's with second, third, and fourth graders. Students, reading below grade level, comprehended better when listening than orally or silently reading.

The works cited imply that the auditory mode of presentation may be superior to the visual mode when considering young children or low achievers.

#### Visual Mode

Witty and Sizemore's (1959) literature survey suggested that though young children prefer the auditory mode, as they get older there is a gradual shift to



preference of the visual mode. By age sixteen, the visual mode is preferred. In contrast, four recent studies found the visual mode to be more effective than the auditory mode among groups of young children: Carterette and Jones (1966), Huizenga and Estes (1970), Swalm (1972), and May and Hutt (1974).

Carterette and Jones (1966) presented first graders with words to be learned through the auditory mode and the visual mode. Words presented visually were recognized more easily than words presented auditorily.

Huizenga and Estes (1970) gave 28 learning disabled children, from eight to twelve years of age, ten paired-associate learning tasks using both auditory and visual presentations. There were consistently more correct responses when the word pairs were presented through the visual mode than the auditory mode.

Swalm (1972) controlled for academic achievement when testing second, third, and fourth graders. He gave all subjects an oral reading, silent reading, and listening test using the cloze procedure to test comprehension. Students, who were above average readers, comprehended best when reading silently, which is a visual presentation.

May and Hutt (1974) tested sixty, nine-year-old, middle class public school children. The children were exposed to a single list of nouns, and then tested for recall and recognition. Students given the visual presentation (slides) performed better than the students

who received the auditory presentation (tape recording).

These results support the premise that varying groups--from first grade to high school, and from learning disabled to above average achievers--prefer a visual presentation.

#### Combination Auditory-Visual Mode

There are two viewpoints concerning the superiority of the combination auditory-visual mode. One claims that it is the best mode of presentation for learning; the other that it is equal to the visual mode, and these two are best.

Munsterberg (1894) did one of the first studies which implied that material is most easily learned when presented through both the auditory and visual modes. He showed digits and colors to his subjects in a visual, auditory, and combined form, requiring that they remember the associations. The combined mode presentation produced significantly better results.

In the 1960's, several researchers expressed similar views. After a series of experiments, Hartman (1961) concluded that "redundant information simultaneously presented by the audio and print channels is more effective in producing learning than is the information in either channel alone" (Hartman, 1961, p. 42). Wepman (1971) applied this concept to reading. He developed a multisensory approach on the basis that reading is related to development of verbal symbolic behavior--both auditory and visual. Jester and Travers (1966)



concluded from their work that a combined presentation is better than either the auditory or visual alone.

Bursuk (1971) used the visual and combined aural-visual instructional approaches to improve the reading comprehension of 132 tenth grade, below average readers. The combined approach was more effective in improving reading comprehension than the completely visual approach.

Bruinink and Clark's (1970) study stresses the superiority of either a combination auditory-visual or visual presentation. Twelve first graders, twelve third graders, and twelve fifth graders were given a test of paired associates which were obtained from the Thorndike-Lorge Word List. Tests were administered under auditory (listening), visual (pictures), and combination modes of presentation. For all groups, the visual and combined modes resulted in significantly better performance than the auditory mode. The visual and combination presentations may have had an advantage due to the imagery-producing quality of the pictures.

Similar results were found by Lockard and Sidowski (1961), VanMondfrans and Travers (1964), Horowitz (1969), Fillmer and Linder (1970), and Walker (1974-5). Subjects ranged from grades three to eleven.

The theories supporting a multisensory approach to learning are not supported by studies which propose that the visual mode is equal to the combined auditory-visual mode of presentation. Research results are

inconclusive; it cannot be determined with certainty whether a combination auditory-visual presentation is more effective than either the auditory or visual alone.

#### Equality of Modes

Many recent studies have concluded that there is no mode of presentation which facilitates learning more than the others. There is a great deal of literature to support this viewpoint.

Bruinink (1968) used either the look-say or phonic approach to teach 102 second and third grade Negro boys fifteen unknown words. Immediate and one week delayed recall tests showed no significant difference in either method.

Ringler, Smith, and Cullinan (1971) did a similar study with 128 first graders. A vocabulary list of 50 words based on the children's spoken language was taught to small groups using different modality presentations--auditory, visual, kinesthetic, or combined. There was no difference in the amount of learning which took place among the groups.

Kroll (1973) drew the same conclusions based his study of sixty high ability readers and sixty low ability readers in the fifth and sixth grades, using a state mandated classroom textbook, How Scientists Think and Work, to obtain visual and auditory passages.

McCracken (1974) found that children learned equally well under either the sapiditory, visual/sapiditory,

auditory/sapidity, or combination of all modes, when testing 250 kindergarteners and 240 first graders in a low class school district.

### Summary

A survey of literature indicates that there is no conclusive evidence to support the existence of a superior mode of presentation. Under controlled conditions, either the auditory, visual, or combination auditory-visual mode of presentation may have been more effective for a particular group. These results vary with age, intelligence, academic achievement, social background, and tests and materials used. Other studies, which have had large samples and have made use of actual instructional techniques, have shown that all modes are equally effective across the elementary grade levels.

### The Effect of Modality Preference on Learning

Modality research has considered whether performance is significantly better when information is presented through the preferred or the nonpreferred mode. Many studies have found that students perform significantly better when information is presented by way of their preferred mode. Numerous other research reports have concluded that effective learning will take place regardless of whether the modality preference of the student is consistent with the mode of presentation.

### Modality Preference as a Learning Facilitator

The viewpoint that the mode of presentation should



facilitate learning is explained by Dechant (1966):

In addition to an understanding of the pupil's maturational, experiential, intellectual, neural, physical, social, emotional, motivational, language and sensory characteristics, knowing the pupil means knowing his preferred mode of learning. Identification of the child's mode of learning may well be the end goal of classroom diagnosis. . . It would seem reasonable to utilize instructional materials which are congruent with each learner's particular strengths in perception, imagery and recall. (p. 23)

Many research studies support this view.

The purpose of Kalin and McAvoy's (1973) study was to determine if learning is increased when information is presented through a preferred sensory channel. Three hundred introductory educational psychology students were given questionnaires to determine modality preferences. Then they were exposed to four different instructional methods--reading, listening, reading and listening, listening and viewing slides. Results indicated that the students have modality preferences of which they are aware, and there was a significantly higher rate of learning when information was presented by way of the preferred mode.

Lilly and Kelleher (1973) used twenty eight vocabulary words from the Mills Learning Methods Test in both auditory and visual presentations to determine the modality preference of 57 educationally handicapped children. Stories from the Durrell Analysis of Reading Difficulty Test were then presented in printed and taped forms. Each story had 28 facts, and the children were

asked to retell the story. Eleven auditory and eleven visual learners were consistent on both tests, indicating that the mode of presentation is significantly related to the children's modality preferences.

An Independence, Missouri Title III Project (1973) provided an inservice program for kindergarten and first grade teachers to help them identify children who needed help in developing learning modality skills necessary to learn to read. Eighty-eight teachers selected 632 children from a total of 2,328 who were deficient in one or more of ten areas of learning modality skills (pre-reading skills). The teachers were then supplied with instruction, workshops, graduate assistants, and other aids to help improve instruction in modality skills. By the end of the year, the students showed a 60% growth in six of the ten skill areas, and they appeared ready to cope with the formal reading instruction in the first grade. This indicates that improving learning modality skills will also enhance performance in other areas of academic achievement, such as reading.

Daniel and Tacker (1974) divided 45 eight year old children into three equal groups--an auditory preference group, a visual preference group, and a group which showed no modality preference. Each group was exposed to lists of CVC (consonant-vowel-consonant) trigrams through preferred and nonpreferred modalities. Results indicated that recall was best when the learning

stimuli was presented through the preferred mode. Children with no strong modality preference scored equally well when trigrams were presented auditorily or visually. Daniel and Tacker (1974) concluded that modality preferences can be an important factor in learning.

#### Learning Unaffected by Modality Preference

Several studies support the view that individuals can learn equally well when information is presented through either the preferred or nonpreferred modes.

Many (1965) found that 352 sixth graders comprehended best when material was presented for reading, rather than listening. If modality preferences affected learning, then it is logical that the children would perform best when information was presented by way of the preferred mode. The group would not have shown a tendency to perform best through only one mode of presentation.

Bateman (1968) found that the auditory method was superior for reading and spelling among both auditory and visual first grade learners. Bruinink (1968) taught unknown words to twenty auditory and twenty visual learners in the second and third grades. For all children, there was no significant difference when the words were presented through either the auditory or visual mode. Both studies indicate that modality preferences have no effect upon learning.

Using the New York University Modality Test, Ringler, Smith, and Cullinan (1971) divided 128 first graders into



modality preference groups--30 auditory learners, 33 visual learners, 28 kinesthetic learners, and 37 with no strong modality preference. The children participated in  $7\frac{1}{2}$  hours of small group instruction, during which they were taught 50 words in their speaking vocabulary by way of preferred or nonpreferred instructional modes. Students who were taught through their preferred mode did not perform better on post tests than students who who were not.

Broski (1974) presented listening passages at normal, expanded, and compressed rates to thirty learning disabled children. Half were auditory learners, and half were visual learners. There was no significant difference in the comprehension scores of the rate altered selections between modality groups, implying that modality preferences do not affect learning.

#### Summary

The literature indicates that there is no consensus concerning the extent to which regard for modality preferences facilitates learning. Many studies present convincing evidence that learning is most effective when stimuli are presented by way of the preferred mode. Numerous other studies indicate that effective learning takes place when information is presented through preferred or nonpreferred modes.



### Summary of the Chapter

There exist two main areas in modality research. The first concerns the existence of a superior mode of presentation. The second pertains to whether modality preferences should be considered in instruction. There is no consensus in either area.

This study does not attempt to reconcile differing opinions in research, but it explores both areas further. It also examines aspects of modality preference which have not been previously considered to a great extent. This includes reading and listening comprehension on the literal and inferential levels, and teachers' and students' awareness of strengths in reading and listening.

## Chapter III

### DESIGN OF THE STUDY

This study investigated the effects of modality preference on reading and listening comprehension. Literal and inferential levels of comprehension were considered when information was presented through preferred and nonpreferred modes. Results indicated the effectiveness of the mode of presentation for each modality group, as measured by comprehension and recognition of information. Thus, implications were cited regarding the importance of considering modality preferences in ordinary classroom situations.

This study also examined students' awareness of their strengths in reading and listening, and their teachers' observations in comparison with the results of this study.

### Hypotheses

The following hypotheses were tested:

1. There is no learning modality which is preferred more than others among selected students.
2. Among selected students with a preference toward the visual mode, whether reading or listening, there is no difference in:

- a. Literal comprehension
  - b. Inferential comprehension
  - c. The total of literal and inferential comprehension.
3. Among selected students with a preference toward the auditory mode, whether reading or listening, there is no difference in:
  - a. Literal comprehension
  - b. Inferential comprehension
  - c. The total of literal and inferential comprehension.
4. Among selected students with a preference toward the combination auditory-visual mode, whether reading or listening, there is no difference in:
  - a. Literal comprehension
  - b. Inferential comprehension
  - c. The total of literal and inferential comprehension.
5. Among selected students with no preference toward a learning modality, whether reading or listening, there is no difference in:
  - a. Literal comprehension
  - b. Inferential comprehension
  - c. The total of literal and inferential comprehension.
6. When reading, there is no modality preference group which showed greater strengths than the other groups in:
  - a. Literal comprehension
  - b. Inferential comprehension
  - c. The total of literal and inferential comprehension.

7. When listening, there is no modality preference group which showed greater strengths than the other groups in:

- a. Literal comprehension
- b. Inferential comprehension
- c. The total of literal and inferential comprehension.

8. Students are not aware of whether they perform best when reading or listening, or perform equally well when reading and listening.

9. Teachers' observations, concerning whether their students perform best when reading or listening, or perform equally well when reading and listening, are not consistent with the results of this study.

### Methodology

#### Subjects

The sample consisted of 53 fourth grade students from Klem Road South School in the Webster Central School District. This was a middle to upper middle class suburban school. A sample of average students at this school was selected. Due to economic and other cultural factors, the average child at Klem Road South School was judged to be average to slightly above average according to national norms.

Scores from tests taken at the beginning of fourth grade were used to select the sample. Selected children had intelligence quotients ranging from the fourth to seventh stanines on the Otis-Lennon Intelligence Test; the mean intelligence quotient is 111 (stanine six).

On the Iowa Achievement Tests, reading achievement scores ranged from the fourth to the seventh stanines; the mean score fell within the sixth stanine. These test scores indicate that this sample is average to slightly above average in intelligence and reading achievement, if the average scores are considered to fall within stanines four through six.

Fourth graders were chosen to be studied because at this grade level, children have developed refined and useful skills in reading, and also have been exposed to a great deal of auditory stimuli in the learning experiences of the previous grades. To provide the best learning experience, it is useful to know if modality preferences in reality have a significant effect upon reading and listening comprehension, considering that by the fourth grade the children have been frequently exposed to both visual and auditory modes of presentation.

### Instruments

Two tests were selected to determine modality preferences: the Revised Baxter Test (1971) and the Ladd Informal Test of Learning Modalities (1972). Both tests involve learning memory tasks which can be administered to small groups of up to six children.

The modality preferences of individual students (auditory, visual, combination auditory-visual, or no preference) were determined by the amount of correlation between scores on both tests. Auditory learners performed



better on auditory than visual subtests on both tests. Visual learners performed better on visual than auditory subtests on both tests. Combination learners had visual and auditory subtest scores which did not vary more than one point on each test. Students with no observable modality preference had scores on one test which indicated a preference toward one mode, and scores on the other test which indicated a preference toward the opposite mode.

The auditory and visual subtests of the Revised Baxter Test were used. The children were asked to remember as many items as possible on a shopping list which was presented orally, and one which was presented visually. The auditory list was read twice to the children; the visual list was written on the blackboard and the children were given one minute to study it. After each presentation, the children were asked to write the list. Partial credit was given if a response was not totally correct.

The auditory and the visual portions of the Ladd Informal Test of Learning Modalities were also used. In the auditory portion, the children were asked to recall and write in sequence, digits which had been read to them. In the visual portion the children were shown a nonsense word and a picture for three seconds. When the nonsense word was taken away, the children were asked to write it when they were shown just the picture. Partial credit was given for responses which were not totally

correct.

Reading and listening materials were obtained from SRA Reading Laboratory I-c, Power Builder Section. Each Power Builder consists of a story or article for independent reading, and an exercise which checks the student's ability to recall and apply what has been read.

Two tests forms were developed from six selected passages of 600-700 words each. Three passages make up each form--a fourth, fifth, and sixth grade reading level passage in each form.

The Fry Readability Graph (1972) was used to determine the reading level of the passages. Table 1 shows the readability data.

Table 1

Readability Data Using the Fry Readability Graph

Passage Title	<u>Average from Three 100 Word Segments</u>		
	Syllables/ 100 Words	Sentences/ 100 Words	Reading Level
The Big Fire	125.3	7.9	4
Reptiles of Today	131.3	8.5	5
Sky Buffalo and His Medicine Pipe	130.3	6.0	6
General Tom Thumb	127.7	7.7	4
The American Game	128.0	8.3	5
Village Beneath the Prairie	132.0	6.9	6

Accompanying each passage were four literal and four inferential multiple-choice comprehension questions.

Using guidelines from Barrett's Taxonomy (1968),



questions were selected from the SRA questions correlating with the passages. When SRA questions were not appropriate, others were developed using Barrett's guidelines. A group of reading seminar students validated the questions, checking for Barrett's literal and inferential levels, and difficulty of question content.

Both test forms were used alternately as materials for the reading and listening tasks. Each reading passage was presented on two sides of a plasticized card. Listening selections were taped and replayed. Questions were presented simultaneously through the auditory and visual modes so that no child had an advantage due to mode of question presentation. The children read the questions from a plasticized card as they heard a pre-taped recording. There was a fifteen second interval between questions.

The reading and listening tasks were meant to simulate the type of learning situation a child might encounter in the classroom.

### Procedures

The children were randomly divided into small groups of five or six. This was done to create a relaxed informal atmosphere similar to that found in a classroom.

There were three testing sessions: the first to determine modality preference, the second and third to complete the reading and listening tasks. Each lasted about thirty minutes. All testing took place in a

regular school room with one examiner.

During the first session, each group was told that they were going to do some things to help the examiner find out more about the way that fourth graders learn. The Revised Baxter Test was then given first, followed by the Ladd Informal Test of Learning Modalities. During the second and third sessions the presentation of reading and listening tasks was alternated among groups, so that the sequence of presentation would not effect performance. Half the children read the passages from Form A and listened to the passages from Form B. The other half of the children read Form B and listened to Form A. This insured that neither the interest level of the passages nor the difficulty of passages and questions influenced the results.

During the second and third sessions, the children first read or listened to selected passages, and only then did they receive the question cards. They were not allowed to look or listen back when answering the questions. When the tape recording of the questions was completed, the question cards were collected, and the students went on to the next selection.

At the end of the third session, the children were asked to indicate on their answer sheet, whether they thought they did better when reading or listening, or whether they did equally well when reading and listening.

The teachers of the selected students were asked

to use their own judgment based on classroom performance, and indicate whether they thought each child performed best when reading or listening, or performed equally well when reading or listening.

### Statistical Analysis

To determine the interrelationships between modality preference, and reading and listening comprehension on the literal and inferential levels, two and three factor analysis of variance was used. The effect of the mode of presentation, auditory or visual, upon the literal and inferential comprehension of each modality group was considered. Also, comparisons of performance between modality groups were made.

The children's and teachers' responses to questions concerning reading and listening performance were compared to results from the reading and listening tasks, since these are considered to be representative of classroom work. The Chi Square Formula was used to compare expected and obtained results.

### Summary

In order to investigate the effects of modality preference on reading and listening comprehension, a sample of 53 average and slightly above average fourth graders was selected. They were given the Revised Baxter Test and the Ladd Informal Test of Learning Modalities to determine modality preference. The students then

completed reading and listening tasks with multiple-choice comprehension questions on the literal and inferential levels. Data was analyzed using analysis of variance. Children and their teachers were asked if they thought performance was best when reading, listening, or of equal strength when reading or listening. This data was analyzed using the Chi Square Formula.



## Chapter IV

### STATISTICAL ANALYSIS

The effects of modality preference on reading and listening comprehension were studied on the literal, inferential, and total of literal and inferential levels. Information was presented through preferred and nonpreferred modes to determine if learning was facilitated when the mode of presentation was consistent with the modality preference of the learner. Also, the students' and their teachers' awareness of strengths in reading and listening were compared with the results of this study.

### Findings

#### Occurrence of Modality Preferences

Among the 53 subjects, there were 10 auditory learners (19%), 22 visual learners (42%), 11 combination auditory-visual learners (21%), and 10 learners with no modality preference (19%). To determine whether there was a significantly greater number of subjects in any modality group, an analysis for the difference between percentages was used. The standard difference between percentages was determined, and then the ratio of the difference to the standard error was computed. A t-ratio



resulted.

In comparing the percent of the visual learners to the percents of auditory learners, combination auditory-visual learners, and learners with no preference, the  $t$ -ratios, 2.250, 2.185, and 2.250 respectively, were significant at the .05 level. The  $t$ -ratio, 1.911, which compared the percent of combination learners with the percents of auditory learners and learners with no preference was not significant. The percent of auditory learners was equal to the percent of learners with no preference. These results indicate that there was a significantly greater number of visual learners, than learners in any other group. There was not a significant difference in the percent of learners among the other three groups.

#### Interaction of Mode, Question Level, and Modality Preference

Initially, a three-factor analysis of variance determined the interactions among the variables being studied (mode, question level, and modality preference). Factor A was the mode of presentation: reading and listening. Factor B was the level of question: literal inferential, and the total of literal and inferential. Factor C was the modality preference of the subject: auditory, visual, combination auditory-visual, and no preference. A significant interaction between the mode of presentation and the level of question was found ( $F=7.67$ ); the data was then analyzed using a two-factor

analysis of variance. Results on the literal, inferential, and total levels were considered.

According to raw mean scores (Table 2) auditory learners performed slightly better than the other groups in total listening scores. Auditory, visual, and combination learners had better total scores in listening than reading. Only the learners with no modality preference had better total scores in reading than listening.

Table 2  
Reading and Listening Mean Scores

Modality Group	Literal		Inferential		Total	
	Read	Listen	Read	Listen	Read	Listen
Auditory	8.00	10.10	8.90	9.50	16.90	19.60
Visual	8.86	9.77	9.04	9.09	17.90	18.86
Combination	9.45	9.91	9.00	8.81	18.45	18.72
No Preference	9.20	9.70	9.70	8.80	18.90	18.50

Table 3 indicates that there was no significant differences among the mean scores of the four modality groups, when analyzing the data according to level of question.

Table 3  
Interaction Among Modality Groups

Question Level	SS	MS	df	F
Literal	8.17	2.72	3,50	0.61
Inferential	1.49	0.49	3,50	0.17
Total	5.84	1.94	3,50	0.17

Further evidence of the similarities among modality groups is shown on Table 4. To determine if there was a difference among modality groups when performing the reading and listening tasks, analysis of the interaction between the mode of presentation and modality preference was made. Table 4 shows that there were no significant differences, indicating that in addition to equal performance across the literal, inferential, and total levels (Table 3), there was no difference among groups in reading performance, and no difference in listening performance.

Table 4

Interaction of Modality Preference and Presentation Mode

Question Level	SS	MS	df	F
Literal	9.34	3.11	3,50	1.44
Inferential	6.20	2.06	3,50	0.95
Total	28.55	9.51	3,50	2.00

Although there was no difference among modality groups in reading and listening performance, examination of reading and listening scores shows (Table 5) that there was a significant difference ( $p < .01$ ) between reading and listening scores at the literal level ( $F=11.14$ ).



Table 5

## Interaction Between Modes of Presentation

Question Level	SS	MS	df	F
Literal	24.08	24.08	1,50	11.14*
Inferential	0.33	0.33	1,50	0.15
Total	18.75	18.75	1,50	3.95

\* When  $p < .01$ , there is a significant difference between reading and listening scores at the literal level.

The reading and listening scores of Table 6 show that the literal score for listening, 9.888, was significantly higher than the literal score for reading, 8.944, at a lower standard deviation. Since there was no difference in the performance of the four modality groups, all groups performed better when listening than reading on the literal level. There was no difference between reading and listening scores on the inferential and total levels.

Table 6

## Comparison of Reading and Listening Scores

Question Level	Reading Scores		Listening Scores	
	Mean	SD	Mean	SD
Literal	8.944	2.013	9.888	1.574*
Inferential	9.148	1.471	9.037	1.624
Total	18.055	2.916	18.888	2.710

\* When  $p < .01$ , listening scores are significantly higher than reading scores.

### Expectations of Students and Teachers, and Observed Results

On the basis of classroom observations, three teachers evaluated the children in their homerooms as performing best when reading or listening, or equally well when reading or listening. The distribution of expected and observed results is illustrated in Table 7. Raw scores were used to determine if the children did better when reading or listening; students excelling in both reading and listening had identical total scores on the reading and listening tasks.

Table 7

Comparison of Expected and Observed Results  
for Reading and Listening Performance

	Number of Children Excelling in Each Mode of Presentation		
	Reading	Listening	Both
Teachers' Expectations	11	11	31
Students' Expectations	20	11	22
Observed Results	19	30	4

Using the Chi Square Formula, when comparing the number of students that the teachers expected to be in each group with the actual number in each group,  $\chi^2=62.16$ . When comparing the students' expectations to the observed results,  $\chi^2=48.01$ . Both scores are significant at the .01 level, indicating that neither teachers nor students were aware of strengths in reading, listening, or both.



Despite discrepancies between expected and observed results, Table 5 indicates that there was no significant difference between total reading scores and total listening scores. This explains the difficulty in accurately predicting strengths in reading and listening performance based on raw scores.

### Analysis and Interpretations of Hypotheses

Each hypothesis is stated, accepted or rejected, and discussed in view of the data presented.

1. There is no modality preference which is preferred more than the others among selected students.

The first hypothesis was rejected. There were nearly equal numbers of students displaying preferences toward the auditory mode, the combination auditory-visual mode, or having no modality preference. The number of visual learners was significantly greater than the number of learners in any other group.

2. Among selected students with a preference toward the visual mode, whether reading or listening, there was no difference in:

- a. Literal comprehension
- b. Inferential comprehension
- c. The total of literal and inferential comprehension

3. Among selected students with a preference toward the auditory mode, whether reading or listening, there was no difference in:

- a. Literal comprehension
  - b. Inferential comprehension
  - c. The total of literal and inferential comprehension.
4. Among selected students with a preference toward the combination auditory-visual mode, whether reading or listening, there is no difference in:
- a. Literal comprehension
  - b. Inferential comprehension
  - c. The total of literal and inferential comprehension.
5. Among selected students with no preference toward a learning modality, whether reading or listening, there is no difference in:
- a. Literal comprehension
  - b. Inferential comprehension
  - c. The total of literal and inferential comprehension.

The second, third, fourth, and fifth hypotheses were considered together because there was no significant difference among the scores of the four modality preference groups. Part "a" of these hypotheses was rejected. There was a difference in reading and listening performance on the literal level. All groups comprehended more information when listening than reading. This means that they were able to recognize more facts, directly stated in the selection, when listening. Parts "b" and "c" of these hypotheses were accepted. On the inferential and total levels, there was no difference in scores whether reading or listening. This means that on the inferential

level, students were able to draw conjectures and conclusions, based on information directly cited in the passages, equally well when reading and listening. Despite better performance when listening than reading on the literal level, when literal and inferential scores were combined, there was no difference in total reading and listening comprehension ability.

6. When reading, there is no modality preference group which showed greater strengths than the other groups in:

- a. Literal comprehension
- b. Inferential comprehension
- c. The total of literal and inferential comprehension.

7. When listening, there is no modality preference group which showed greater strengths than the other groups in:

- a. Literal comprehension
- b. Inferential comprehension
- c. The total of literal and inferential comprehension.

The sixth and seventh hypotheses were accepted. Modality preference of the learner did not affect the scores on either reading or listening tasks. When raw scores were considered, auditory learners did better than the other groups on the listening tasks, but the difference was not significant. Whether reading or listening, on the literal, inferential, or total levels, all groups did equally well.



8. Students are not aware of whether they perform best when reading or listening, or equally well when reading or listening.

9. Teachers' observations concerning whether their students perform best when reading or listening, or equally well when reading or listening, are not consistent with the results of this study.

The eighth and ninth hypotheses were accepted. Students and their teachers were not able to identify superiority in reading or listening skills. Since there was no difference between total reading and listening scores, this indicates that the students have well developed skills in both areas. Any superiority based on raw scores would be most difficult for the students and their teachers to detect. The presence of good skills in both areas implies that the students learn equally well when reading or listening, therefore, it is not necessarily important for either the students or their teachers to be aware of any slight difference in ability. The students will learn regardless of mode of presentation.

#### Summary

Among the selected students, the visual mode was preferred more than any other mode. Modality preference did not effect reading and listening comprehension scores. On the literal level, all modality groups

performed better when listening than reading. On the inferential and total levels, there was no difference in reading and listening skills. Since there was no significant difference in reading and listening performance, students and their teachers were not able to accurately predict whether scores would be better when reading or listening, or equal when reading or listening.



## Chapter V

### CONCLUSIONS AND IMPLICATIONS

The correlations between modality preference and reading and listening comprehension were investigated in order to determine the extent to which modality preferences should be considered in regular classroom instruction. In most classrooms, the students are exposed to a variety of learning stimuli, and are required to comprehend information presented through various modes on the literal and inferential levels. A sample of average to slightly above average fourth grade students was studied to establish the effect of modality preference on reading and listening across the literal, inferential, and the total of literal and inferential levels of comprehension.

#### Conclusions

Based on the data obtained from learning memory tasks (modality preference tests), and reading and listening comprehension tasks, several conclusions were drawn. These conclusions apply specifically to the sample fourth grade population studied, but may be generalized to other matching populations. The

conclusions are as follows:

1. Some students display preferences toward the auditory mode, the visual mode, or the combination auditory-visual mode.

2. Some students do not display any modality preference.

3. More students prefer the visual mode than any other mode.

4. Regard for modality preference does not facilitate learning.

5. The modality preference of the learner affects neither reading comprehension nor listening comprehension on the literal, inferential, and the total of literal and inferential levels.

6. Reading and listening skills are equally developed in all learners, regardless of modality preference.

7. On the literal level, mode of presentation affects comprehension (in favor of listening) for all modality groups.

8. On the inferential level, for all modality groups, the mode of presentation does not affect comprehension.

9. On the total level, for all modality groups, the mode of presentation does not affect comprehension.

10. Since total reading and total listening skills are equally developed, students and their teachers are not aware of any slight differences in reading and listening comprehension performance.

### Implications for Research

This study considered a limited aspect of modality research. There are many other areas which need to be explored in order to utilize modality concepts to create optimum learning conditions. It is recommended that further research be pursued.

### Classroom Instruction and Modality Preference

It has been determined that regard for modality preference does not facilitate learning, when reading or listening, for selected average and slightly above average fourth graders. Reading was the only visual mode of presentation considered in this study. Other types of visual stimuli and combination auditory-visual stimuli, which are used in the classroom, need consideration. Also, the effect of modality preference on the education of low achievers at the fourth grade level requires research attention.

The selected fourth graders have been exposed to much auditory stimuli in previous grades, but also have developed good visual skills, such as reading. In the primary grades, there is an emphasis on auditory presentations, while in the upper grades, mode of presentation is often visual. At the primary and upper grade levels, research considering the extent to which modality preference affects learning, when information is presented through various modes to students at different achievement levels, may prove to be most useful to teachers.



### Reading and Modality Preference

The role of modality preference in the acquisition of reading skills has had limited study. The reading process extensively involves auditory and visual skills. A deficiency in either area may result in severe reading problems. Investigation of modality preference on the development of reading skills, as well as the extent to which modality-based reading instruction facilitates reading skill development, would be beneficial.

### Learning Disability and Modality Preference

Modality research with learning disabled children needs consideration. The influence of modality preference on the learning process of this group may be significant. For example, recognizing a preference toward multi-modal or mono-modal instruction may provide a valuable educational insight. Some children, especially those with learning problems, may respond best to one particular mode of instruction, or they may be best stimulated by multiple modes of presentation. Programs to diagnose preferences and to implement multi-modal and mono-modal instruction should be created and tested.

### Degree of Modality Preference

Most modality research tests learners for a preference toward a particular mode, and not the extent to which that preference is developed. Some children show a preference to a particular mode, but also have strengths in learning through other modes. Also, the opposite

may be true; a child may show a preference to a particular mode, but this preference may be representative of a weak modality skill. If research determines that modality preference has a significant effect upon learning for some groups, the next step should be to determine the proficiency of preferred and nonpreferred modality skills. Research has not explored this area.

#### Development of a Standardized Modality Test

Present research has utilized an extensive variety of instruments to measure modality preference. These instruments have not measured the same skills, and are often devised by experimenters to meet their own individual purposes. There is a vital need for a valid standardized modality test, which can be administered easily by teachers and researchers to individuals or groups in a reasonably short length of time. A standardized tool would make it possible to achieve more continuity in modality research, thus making conclusions more meaningful. It would also enable classroom teachers to easily identify modality preferences of children, and more effectively individualize instruction, when the need arises.

#### Implications for Classroom Practice

The results of the study indicate that modality preference does not effect reading and listening comprehension. For this reason, it is not important



that classroom teachers concern themselves with determining the modality preference of average and slightly above average students at the fourth grade level.

Regardless of modality preference, learning will not be facilitated if information is presented through the preferred mode.

Total reading comprehension and total listening comprehension of the selected students were equal. These students have developed good skills in both areas. Their teachers should continue to provide them with an interesting variety of learning stimuli through both modes, and profitable learning experiences should result regardless of whether the students are reading or listening. Continuous exposure to both modes will serve to maintain and refine all comprehension skills.

On the literal level, all students performed better when listening than reading. Teachers can best utilize literal listening skills by providing listening stimuli when there are many facts or details to be considered, such as in social studies and the other content areas. The students should also be provided with other learning experiences to strengthen comprehension on the literal level when reading. Reading becomes increasingly important in the upper grades; consequently, reading skills should be developed as thoroughly as possible.

On the inferential level, there was no difference

in performance whether reading or listening. As a result of exposure to learning stimuli, the students have been required to think about information and to apply it to related or extraneous circumstances. Their ability to use inferential thinking has been generalized over both modes of presentation, reading and listening. To promote the growth of inferential comprehension skills, the children need continual opportunities to make use of inferential thinking. Instruction in reading and in the other content areas provides many excellent situations for inferential comprehension.

In the quest to provide students with effective learning stimuli, the results of this research study imply that there is no superior mode of presentation. Teachers should continue the use of multiple modes to facilitate optimum learning.

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Appendix A  
THE REVISED BAXTER TEST

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## THE REVISED BAXTER TEST

The Revised Baxter Test is an informal way of determining optimal learning modality. It should be used with a group of not more than three to six pupils. The following steps are taken during its administration:

1. Tell pupils they will pretend they are going to the store for a list of items, and you want to see which kind of list they will remember best. This is done three different times, using three different lists. The three presentations are as follows:
  - a. Visual--The list is written on the chalkboard as the pupils watch, and they are given one minute to study it visually. It is then erased, and pupils are asked to recall and state orally the words they remember (as a test of learning).
  - b. Audio--The list is given orally so pupils hear it. Then it is repeated. They are asked to recall the words they have heard (as a test of learning).
  - c. Kinesthetic--The list is given orally with pupils writing it down from dictation. (Explain that spelling does not count!) Then they write the list again for learning practice. Finally they are asked to write the list from memory (as a test of learning).
2. Test: After each presentation, test pupils' learning as indicated above. Invite each to repeat the list to you only if he wishes. (Be sure pupils do not hear or see responses of others.) The list does not have to be given in the exact order that it was presented.
3. On a list of pupils' names, note the number of words recalled after each presentation. This gives a general indication of the child's best learning mode.



Watch for these additional indications of perceptual mode:

1. Audio learners will often move their lips or whisper as they try to memorize the list. They will volunteer quickly to repeat the auditory list.
2. Visual learners may close their eyes or look at the ceiling to recall a visual picture of the list. They will volunteer quickly for the visual list.
3. Kinesthetic learners will use their fingers to count off items, to write in the air, or to make writing movements on the desk.

First Presentation (Visual Learning List)

Younger Children

soap  
pencil  
comb  
ice cream  
paper

Older Children

toothpaste  
kleenex  
stationary  
stamps  
chewing gum

Second Presentation (Auditory Learning List)

Younger Children

popcorn  
eraser  
bandaids  
candy  
cough drops

Older Children

talcum powder  
nail file  
vitamins  
fountain pen  
magazine

Third Presentation (Kinesthetic Learning List)

Younger Children

pen  
comb  
writing paper  
string  
gum drops

Older Children

cough drops  
lipstick  
razor blades  
rubberbands  
shaving cream

Note: With very young children, or in the cases of reading disability, it may be desirable to substitute numbers for words. The administration procedure is the same in either case.

(This instrument was devised by Wynn Baxter at Chico State College, and included in his Magnetic Patterns of the English Language, Veritas Publications, Pasadena, California. It was revised by Mary Heimberger, Falk Research Office, University of Pittsburgh, 1971.)

Appendix B

LADD INFORMAL TEST OF LEARNING MODALITIES

## LADD INFORMAL TEST OF LEARNING MODALITIES

Any informal test must be considered only as a means of observing the learner, but it does give the teacher a chance to look at some specific behaviors of the child. The following technique indicates one way of observing what the child does while using several modes of learning.

The technique involves the child's learning five examples or symbols by having them presented through different senses. Since response is always in writing, it is possible to administer the test to a small group.

### I. AUDITORY MEMORY

Say, "Listen to the numbers that I will say. When I am finished, pick up your pencil and write the numbers on your paper."

- |                    |         |
|--------------------|---------|
| 1. 3-4-1-7         | "Write" |
| 2. 8-4-2-3-9       | "Write" |
| 3. 3-8-9-1-7-4     | "Write" |
| 4. 5-1-7-4-2-3-8   | "Write" |
| 5. 1-6-4-5-9-7-6-3 | "Write" |

### II. VISUAL MEMORY

Say, "I am going to show you some pictures and some words. I'll show you one at a time and then ask you to write the word that fits the picture."

- | Picture Card | Word Card |
|--------------|-----------|
| 1. (Picture) | rac       |
| 2. (Picture) | lisk      |
| 3. (Picture) | ered      |
| 4. (Picture) | iregt     |
| 5. (Picture) | arechet   |

### III. KINESTHETIC MEMORY

Say, "I am going to show you some word cards. I want you to look at the word and write it in the air. I will then put the card aside while you write the word on your paper."

- | Word Card   |         |
|-------------|---------|
| 1. nma      | "Write" |
| 2. archi    | "Write" |
| 3. roflo    | "Write" |
| 4. lpneci   | "Write" |
| 5. tilapmal | "Write" |

## IV. COMBINATION MEMORY

Say, "I will say a word and ask you to repeat it after me. Then I will show the word to you and ask you to write it in the air. Finally you will write it on paper."

	Listen	Say	Show	Air	Write
1.	pmal	"	"	"	"
2.	sifh	"	"	"	"
3.	taniph	"	"	"	"
4.	latlilma	"	"	"	"
5.	uosehmo	"	"	"	"

(This instrument was devised by Eleanor Ladd, Temple University, and cited in Reading Instruction Through Diagnostic Teaching by Larry Harris and Carl Smith, Holt, Rinehart, and Winston, 1972.)



## **Appendix C**

### **READING AND LISTENING SELECTIONS: INFORMATION AND DIRECTIONS**

READING AND LISTENING SELECTIONS:  
INFORMATION AND DIRECTIONS

The following reading and listening selections were obtained from SRA Reading Laboratory I-c, Science Research Associates, 1961. Reading levels were determined by the Fry Readability Graph.

In order to standardize the length of the selections, an occasional word or sentence may differ or have been eliminated from the original SRA selection.

For all selections, questions 1-4 are literal; questions 5-8 are inferential. All questions, except those marked with an asterisk (\*), were formulated by SRA. Those others were formulated by the author of this paper. Asterisks were omitted from children's question cards.

FORM A

The Big Fire (Based on THE BIG FIRE by Elizabeth Olds, Houghton Mifflin Company, 1945; Science Research Associates, Inc., 1961; reading level, grade 4)

Reptiles of Today (Based on INTRODUCING ANIMALS WITH BACKBONES by William and Helena Bullough, Methuen and Company, Ltd., 1954; Science Research Associates, Inc., 1961; reading level, grade 5)

Sky Buffalo and His Medicine Pipe (Based on THE INDIANS' SECRET WORLD by Robert Hofsinde, William Morrow and Company, Inc., 1955; Science Research Associates, Inc., 1961; reading level, grade 6)

FORM B

General Tom Thumb (Adapted from THE WORLD'S GREATEST SHOWMAN by J. Bryan III, Random House, Inc., 1956; Science Research Associates, Inc., 1961; reading level, grade 4)

The American Game (Adapted from BASEBALL FOR YOUNG CHAMPIONS by Robert Antonacci and Jene Barr, Whittlesey, Inc., 1956; Science Research Associates, Inc., 1961; reading level, grade 5)

Village Beneath the Prairie (Reprinted from INSECT BUILDERS AND CRAFTSMEN by Ross E. Hutchins, Rand, McNally and Company, 1959; Science Research Associates, Inc., 1961; reading level, grade 6)

### Directions for Reading

Examiner says:

Today you will be reading three stories. I will give you the stories, one at a time. Be sure to read carefully, because after everyone has finished each story, we will answer some questions. The story will be collected; and then you will hear some questions on the tape, and you will also be able to read them from the card that I will give you. For example, if this were the story:

Mary was on her way home from school. It was a sunny day, but she was not happy.  
She was alone. (Written on the blackboard)

A question might be:

This story took place in the

- a. morning
- b. afternoon
- c. evening (Written on the blackboard)

Who can tell me what the answer should be? (Student responds "b.") Why?

You will have eight questions to go with each story. Put the letter of the correct answer on your answer sheet. Be sure to follow the tape, so that we all finish together.

When we are finished with the questions for the first story, we will go on to the next story. Are there any questions?

I will pass out the first story now. You may begin to read it as soon as you get it.

### Directions for Listening

Examiner says:

Today you will be listening to three stories. Each story lasts about three minutes, so listen carefully, so that you don't miss anything. After each story, I will pass out a card with some questions on it, and we will answer the questions. While you are reading them, you will also hear them being read on the tape. For example, if this were the story:

The children were happy. It was a beautiful summer day. They were going on a picnic.

A question might be:

The children were

- a. sad
- b. worried
- c. happy (Written on the blackboard)

Who can tell me what the answer should be? (Student responds "c.") Why?

You will have eight questions to go with each story. Put the letter of the correct answer on your answer sheet. Be sure to follow the tape, so that we all finish together.

When we are finished with the questions for the first story, we will go on to the next story. Are there any questions?

I will play the tape of the first story for you now.

---

After all reading and listening tasks are finished, the children are asked, "Do you think you did best when you were reading or listening, or about the same on both. Write your answer on the blank provided."



Appendix D

READING AND LISTENING SELECTIONS AND QUESTIONS

## THE BIG FIRE

by Elizabeth Olds

Clang! Clang! Clang! goes the alarm bell in the Firehouse 3.

Down the brass pole slide the firemen, rushing for their equipment and scrambling to their places on the engine and the truck. The motors roar. Off goes the chief's car, followed by the engine and the hook-and-ladder truck.

As the chief's shiny red car rushes by with its siren wailing, traffic stops dead in the street. Bells clang as the huge fire engine and the hook-and-ladder speed by.

"It must be a big fire!" a boy shouts. "Hook-and-ladder 3 goes only to big fires."

Curious people start to follow the fire trucks. The three vehicles screech to a stop in front of a large apartment building. Flames are shooting out of the windows of the upper stories.

Firemen with axes enter the house. "Get the fire hoses going!" the chief orders. A fireman attaches the long hose to a nearby fire hydrant. Four firemen grab the big hose and point it at the flames licking out of the windows.

When the onlookers press closer to get a better look, policemen shout, "Get back! Move back!"

The chief points to the top of the house. Up goes a ladder. and five firemen climb up and quickly disappear through smoke pouring from the windows. Another fireman remains on the ladder, holding a hose tightly in his hand. "Turn on the water, boys," he shouts toward the street below. Bracing his feet on the ladder, he grips the hose with both hands, for the strong water

Pressure can jerk the hose right out of his hands. He shoots water into the smoke and flames.

Most of the occupants of the apartment building have escaped by now. Sadly and fearfully, they stand in the street and watch firemen carry their furniture and possessions out the door. Grime and sweat cover the firemen's faces. Fires mean hard work and danger.

"Help! Help!" cries a terrified woman at a window. She clutches a little boy in her arms. The flames are so close that the ladder cannot be moved to her window. Firemen come running with a large life net. They stretch it out quickly but carefully and form a circle to hold the net tight.

"Drop you boy, ma'am," hollers the chief. The mother looks frightened as she leans out of the window, and very carefully, drops the boy. The crowd gasps. The boy lands in the net and bounces up and down. The a fireman gathers the boy in his arms.

"Come On, ma'am," the chief shouts. Now the woman leaps from the burning window and lands safely in the net. Two firemen come out the front door carrying an old man. Meanwhile, the big hose has been pouring water into the building.

At last the fire is under control. Nobody has been left in the building. An odor of wet, burned wood is in the air. A few puffs of smoke trail from doors and windows.

After the firemen have made certain that all the flames are out, they nail boards over the doors and lower windows to keep out thieves and curious people who might get hurt. The exhausted firemen gather up their axes and other tools. Most of the crowd has left; only a few children remain to watch the men coil up the hoses. The hook-and-ladder crew turn the wheels that swing the great ladder down onto the truck. They remove their helmets and wipe their hot faces.

## THE BIG FIRE

by Elizabeth Olds

1. The man in charge of the firemen is known as

- a. the policeman
- b. the chief
- c. the hook-and-ladder fireman

2. The fire chief travels to fires in

- a. an automobile
- b. the fire engine
- c. the hook-and-ladder truck

3. The boy dropped from the window was caught by

- a. the hook-and-ladder
- b. a big fireman
- c. the life net

\* 4. The doors and lower windows were boarded up

- a. to prevent the fire from spreading
- b. to keep out thieves
- c. so that the occupants could not see the damage

5. Traffic must stop in the street when

- a. a fire is seen
- b. the chief's car approaches
- c. the alarm goes off in the fire house

6. After a fire, firemen do not leave the building until

- a. the crowd has left
- b. the fire engine has left
- c. the flames are completely out

\* 7. Hook-and-ladder 3 went only to big fires because

- a. it had a loud siren
- b. it could reach upper stories of the building
- c. it had the longest hose

\* 8. The story takes place

- a. in a city
- b. in the country
- c. near a large body of water



## REPTILES OF TODAY

by William and Helena Bullough

Very few of the thousands of strange creatures that lived in the great Age of Reptiles remain to share the world with us. But you can still see a number of interesting reptiles, such as lizards and turtles, in the country or in the zoo.

Lizards and snakes are the most numerous of modern reptiles. They are very common in tropical countries. A few even manage to survive in the colder parts of Europe and North America. On warm summer days you may find lizards or snakes on sandy banks. Before the winter cold they burrow into the ground and fall asleep until spring.

There are hundreds of different kinds of lizards in the world. Lizards feed mostly on insects, worms, and snails. Lizards are often bright red and brown, or yellow and green. When you search for them in the country you will find that they are hard to see unless they are moving. Some of them can change their colors to match their surroundings. They may do this even while you are watching them.

~~When it is frightened by another, a lizard quickly runs away.~~  
If the other animal catches hold of its tail, the tail may break off. While the tail is being eaten the lizard can escape. Losing its tail in this manner is no great handicap for the lizard. The lizard will soon grow a new one.

Snakes are cousins to lizards. Snakes have no legs, so they wriggle along instead of walking. You may be surprised to see how quickly snakes can move. One of the most interesting parts of a snake is its mouth. A snake can open its mouth very wide. Its teeth, or fangs, are very sharp and are bent back like hooks.

The fangs of some snakes are poisonous.

Most snakes live on land. But some snakes live in rivers, lakes, and even in the sea. The sea-living snakes have flat tails and swim like eels.

Other kinds of modern reptiles are not so common as lizards and snakes. Crocodiles and alligators live in swamps and rivers in the warmer parts of the world. They are usually fierce, bad-tempered creatures. They eat any fish or small land animal that they can catch in their strong jaws. Crocodiles are thought to live for a very long time; some of them may be more than a hundred years old.

Turtles are another kind of reptile that lives today. Turtles can live on land or in water. A turtle's body is protected by a shell. The upper part of the shell is made of greatly enlarged ribs. This shell is covered on the outside with plates of bone. The turtle's head, legs, and tail stick out of its shell. Some turtles lay eggs and bury them in sandy banks or on seashores. Turtles, also, are supposed to live to great ages.

Lizards, snakes, crocodiles, alligators, and turtles are the reptiles found today. They are the few that remain from the many that lived millions of years ago during the Age of Reptiles.

## REPTILES OF TODAY

by William and Helena Bullough

1. One place to see some interesting reptiles is
  - a. the mountains
  - b. the zoo
  - c. the city
2. Reptiles are found
  - a. only in warm countries
  - b. in both warm and cold countries
  - c. only in cold countries
3. Crocodiles live
  - a. only a few years
  - b. to a very old age
  - c. as long as insects and worms
4. The most numerous modern reptiles are
  - a. turtles
  - b. crocodiles and alligators
  - c. lizards and snakes
- \*5. A flat tail helps some snakes
  - a. escape from fish
  - b. swim
  - c. fight
- \*6. Crocodiles and alligators
  - a. ~~would die in cold weather~~
  - b. do not need to hunt for food
  - c. can change colors
- \*7. A turtle's shell protects him because
  - a. his body is shielded
  - b. he can't see danger
  - c. he disappears
- \*8. Many types of reptiles have died out because
  - a. man killed them
  - b. they killed themselves
  - c. only the fittest types were able to survive

## SKY BUFFALO AND HIS MEDICINE PIPE

by Robert Hofsinde

This day marked a turning point in the life of Sky Buffalo. He had reached his twenty-first year, and the time had come for him to make his own medicine pipe. It would be one of the most important objects he would ever own.

Sky Buffalo believed that the filling and smoking of the medicine pipe would bring him into contact with the spirits of the whole universe. When he smoked it, he would offer prayers. First, he would have to learn the elaborate way of making and using the pipe, or his prayers would go unheard.

Blue Eagle, an old Sioux, had come with Sky Buffalo to the top of the hill to act as his instructor. Ahead of them the two Indians could see the light green leaves of the ash trees they sought. They needed the wood of the ash tree for the pipestem.

When they reached the grove of trees, the two dismounted and tied up their horses. After a careful search, Sky Buffalo selected and cut a small, straight limb from one of the ash trees. He trimmed it to a length of about twenty-two inches. He bored a hole into the soft pith at one end, using a thin, pointed bone awl. Blue Eagle cut other branches and set three of them up together. Under them he built a small fire. Next, Sky Buffalo went in search of a helper. Carrying the trimmed stick, he went to a fallen log and removed a portion of its rotted bark. He found the helper he was looking for--a little wood-boring grub. Picking it up gently between two fingers, Sky Buffalo put it, head first, into the hole that he had made in the ash stem. Then he closed the opening with a small wooden plug.



Blue Eagle took the small branch from Sky Buffalo and suspended it from a buckskin thong so that it hung directly over the fire, with the plugged end downward. As the wood became hot, the wood borer would want to escape. It could not back out, but it could bore its way through the soft pithy center of the stick. The hollow stick would become the pipestem.

Blue Eagle unwrapped a block of red pipestone from a piece of wet buckskin. Sky Buffalo then marked the shape for the pipe bowl on the stone. Using a hard flint knife, he made a rough outline of the letter T. The pipestone had just been taken from the earth, and the dampened buckskin wrapping had kept it soft enough to be worked with flint and bone tools. Later it would be put in the sun to become dry and hard. Sky Buffalo cut straight down into the bowl. He dug out a deep hole and then bored another hole into one end of the bowl. He continued until the two openings joined. The pipestem would later be fitted into the second opening. Finally, with a piece of sandstone, he rounded off the outside edges of the pipebowl until they were smooth.

As Sky Buffalo worked, he often looked toward the pipestem. At last the grub came out at the top, having bored a hole all the way through the stick. He thanked the little helper politely and returned it to its home in the log.

Sitting by the old man, Sky Buffalo began the important task of decorating his pipestem. Near the mouthpiece he wrapped porcupine quills that had been colored in red berry juice. These represented magic power. A tuft of horsehair, also dyed red, went from this wrapping to the bowl. The horsehair stood for blood. To the top of the stem he added white tail feathers of an eagle, representing the Great Spirit. Blue Eagle took the pipe and explained to Sky Buffalo the meaning of each decoration and the uses of the medicine pipe.

## SKY BUFFALO AND HIS MEDICINE PIPE

by Robert Hofsinde

1. The stem of the medicine pipe was made from the wood of the
  - a. ash
  - b. willow
  - c. oak
2. A hole was bored through the center of the pipestem with
  - a. a porcupine quill
  - b. a buffalo bone
  - c. a wood-boring grub
- \* 3. How many holes did Sky Buffalo bore into the bowl of the pipe
  - a. two
  - b. three
  - c. four
- \* 4. To finish his medicine pipe, Sky Buffalo
  - a. burned the grub to death
  - b. baked the stem in the sun
  - c. decorated it in a special way
5. Sky Buffalo was a member of
  - a. Blue Eagle Indians
  - b. Pueblo Indians
  - c. Sioux Indians
6. Red pipestone is a kind of
  - a. wood
  - b. stone
  - c. metal
7. These Indians spent much time making their medicine pipes because they
  - a. believed that smoking pipes had religious meaning
  - b. had a good time making them
  - c. liked to have more handsome pipes than the other Indians
- \* 8. Sky Buffalo
  - a. learned many things from Blue Eagle
  - b. was ungrateful to Blue Eagle
  - c. did not talk to Blue Eagle

## GENERAL TOM THUMB

by J. Bryan III

We usually think of generals as being men. But General Tom Thumb was smaller than a year-old baby when he was five years old. He was less than two feet high and weighed less than sixteen pounds. His foot was three inches long, and his hand was about as big as a half dollar. His hair was pale blond, and his eyes were dark.

General Tom Thumb was never in the army. He was a big star in Barnum's Museum for over forty years. He first appeared in Barnum's show in 1842,

"Tom Thumb, Eleven Years Old and Only Twenty-five Inches High, Just Arrived from England!" This was in newspapers and posters all over New York when Tom Thumb made his first appearance. Although Tom Thumb was not quite five, P.T. Barnum said he was eleven so that people would think that he had already stopped growing. Tom Thumb didn't come from England, either. He really came from Bridgeport, Connecticut. Barnum, great showman that he was, thought that more people would want to see a foreign star.

Tom Thumb did not come from a family of midgets. His mother and father were just as big as other grownups. Tom Thumb, whose real name was Charlie Stratton, had a brother and two sisters who were not small. Charlie was the only midget in the family. He weighed as much as a normal baby when he was born, but at five months he had stopped growing.

Barnum first hired Charlie for four weeks at three dollars a week plus room and board for himself and his mother. Barnum gave them a short-term contract in case Charlie should suddenly start growing.

Barnum trained Charlie to speak politely, shake hands, and bow. Then Charlie learned a few stage tricks to go with the costumes Barnum had ordered.

On opening night there was a very big crowd. First Barnum made a speech and then Charlie came onstage. Charlie told the people, "I'm great while I'm small, so I don't want to rise but always remain General Tom Thumb in your eyes." Charlie wore a soldier's uniform and a white pigtail wig like the wig that George Washington wore. His tiny boots were no bigger than a water glass. He marched onto the stage, saluted, and waved his ten-inch sword around. His sword was shorter than a foot ruler. He also sang "Yankee Doodle" and told some jokes.

The people loved him. Five thousand people a week came to Barnum's Museum to see him. He put on two shows a day. Between shows he was in the Hall of Living Curiosities. He appeared there with an armless man, a fire-eater, a juggler, a fat boy, and a snake charmer.

Charlie was soon famous. He was making fifty dollars a week, which was a lot of money for a young boy to earn. Charlie toured all over the United States, and thousands of people came to see him. Then Barnum sent him to Europe, and people there loved him, too.

Charlie died in 1883. He was forty-five years old. At that time he was only forty inches high, as tall as a four year old child. He weighed seventy pounds.

Charlie was known and loved all over the world as General Tom Thumb. He was the smallest person ever to be called a general. Tom Thumb made show business history.



## GENERAL TOM THUMB

by J. Bryan III

1. General Tom Thumb was
  - a. an army general
  - b. a famous midget
  - c. a small child
2. The other members of Charlie's family were
  - a. normal in size
  - b. all midgets
  - c. little people
3. Charlie learned a few stage tricks and how to
  - a. dance
  - b. sing "Yankee Doodle"
  - c. juggle
4. Between shows Charlie appeared in the Hall of Living Curiosities with
  - a. an armless man, a fire-eater, and a snake charmer
  - b. a bearded lady and a sword swallower
  - c. a strong man and a trained seal
- \*5. After Charlie started working for Barnum, he
  - a. grew quickly
  - b. never grew
  - c. became General Tom Thumb
- ~~\*6. From Charlie's life, we can learn that it is important~~
  - a. to be rich and to travel
  - b. to use your talents
  - c. to laugh at little people
- \*7. For most of his life, Charlie
  - a. remained in show business
  - b. was in the military
  - c. started his own carnival business
- \*8. Charlie was loved by many people because
  - a. his shows made people happy
  - b. he traveled to many places
  - c. he was a general

## THE AMERICAN GAME

by Robert Antonacci and Jene Barr

The history of baseball shows that the game has changed since it was first played. At first, stakes driven into the ground were used instead of bases. Whenever a batter succeeded in hitting the ball, the players yelled, "Run to your stakes!" Later, flat stones were used as bases. To make the game safer, players used sacks filled with sand. Then when a batter hit the ball, the other players would yell, "Run to your bases!"

Boys who watched the game asked, "What are you playing?" The players answered, "Base Ball." And that is the way the game was named.

As time went on, more and more people began to play the game. In 1938 the first official baseball rules were set up. For the first time the rules called for a diamond-shaped playing field. The first team to score twenty-one "aces," or runs, was considered the winner. It was very common for games to last twenty innings or more before a winner could be declared.

A few years later, in 1846, the official game was played between the Knickerbocker Club and the New York Club. The Knickerbocker Club was a regular team, but the New York Club was a scrub team made up of "pick-up" players. By this time the rules had been changed to limit the length of the game to nine innings and to limit the number of players on a team to nine.

Baseball began to take on a "new look" when players appeared on the field wearing special uniforms. Imagine, if you can, a baseball uniform made up of long pants, a fancy white flannel blouse, and a straw hat. The umpire wore a tall silk hat and a long coat, and carried a cane.

As more people started playing baseball, its rules began to

change even more.

For a long time the catcher took his place far behind the batter and home plate. Perhaps the reason for this was that the bats then in use were quite dangerous weapons. Worn-out cricket bats, ax handles, wagon tongues, rakes and branches of trees were used as bats. A batter was put out when a hit ball was caught on the fly or on a first bounce. Later, when bat sizes were made the same, the catcher moved to a position directly behind the batter. This is where the catcher stands today.

In 1869 the Cincinnati Red Stockings became the first professional baseball team in America. The first of the Big leagues, the National League, was formed in 1876. Other leagues, both major and minor, were formed in quick succession. The American League was formed in 1900.

Baseball fans asked to see more games after the regular season ended. They wanted to see the champions of the two major leagues play against each other in order to decide a world championship. Beginning in 1903 the public got its wish. In that year a series of games was played between the National and American league winners to decide which team would become the champion. This is the World Series.

In 1939 the National Baseball Museum and Hall of Fame was opened in Cooperstown, New York, the town where the first baseball game with rules had been played one hundred years before. Thousands of people visit this shrine every year. In it are pictures as well as equipment and other materials used by the great baseball champions of the past.

Recognizing that baseball is a great American sport, the United States government issued a special postage stamp to celebrate the one-hundredth anniversary of the game. From its beginnings, baseball has grown into a sport that is a favorite of millions.



## THE AMERICAN GAME

by Robert Antonacci and Jene Barr

1. The first World Series baseball game was played in
  - a. 1900
  - b. 1903
  - c. 1939
2. When the first rules were set up, a baseball game lasted
  - a. nine innings
  - b. till the umpire called twenty strikes
  - c. till one team made twenty runs
3. The first professional baseball team was
  - a. the Cincinnati Red Stockings
  - b. the National League
  - c. the Cooperstown team
4. The United States issued a special stamp honoring baseball
  - a. a new stamp was needed
  - b. no stamp like this had been printed
  - c. baseball had become a great American sport
5. When stakes were used to mark bases, running was
  - a. difficult
  - b. dangerous
  - c. against the rules
6. The National Baseball Museum was opened
  - a. before the National League was formed
  - b. after the National League was formed
  - c. the year that the National League was formed
- \*7. Official baseball rules were needed
  - a. because the game lasted too long
  - b. because the stakes were used for bases
  - c. so that everyone played the same
- \*8. Baseball is called the "American Game" because
  - a. The Baseball Hall of Fame is in America
  - b. the United States government issued a postage stamp
  - c. millions of American love to watch and play baseball



## VILLAGE BENEATH THE PRAIRIE

by Ross E. Hutchins

Hundreds of years ago, people lived in feudal villages. Each village was usually surrounded by a wall. During the day the people farmed the nearby fields, and each night they returned to the safety of the walls.

The gates to the village were closed at night, for the forests and mountains were filled with enemies--both real and imaginary. Wolf packs roamed the wild places, and knights from enemy castles often came to make war. Then, too, people believed that there were dragons hiding in the dark forests.

People do not live in feudal villages today. But there are ants, called harvester ants, whose colonies are like tiny feudal villages. In the regions surrounding the colonies, there are even enemies that may seem like dragons and wolves to the tiny ants.

If you have ever crossed the Great Plains of America, you may have noticed neat ant hills set in the centers of large circles of bare ground. These are the ant villages.

Much work goes into the building of the village by the harvester ants. The ants dig deep tunnels into the hard soil of the prairie. Many chambers or rooms are dug, all connected by passages. Sand and soil from this digging are carried up out of the nest and put on the surface in the form of a neat cone. Each night the ants close the gate with small stones. They open the gate again each morning.

In one of the dark chambers in the earth, the queen settles down to laying eggs. The eggs are looked after by the worker ants, who do all the work in the ant village.

If you watched the ants during the summer, you would find them

busy harvesting food. They hurry away from the nest toward the forest of weeds and grasses. If we follow these workers, we can see them climbing small prairie plants. They cut off the tiny seed pods and carry them back to the nest.

The outside gate leading into the underground ant world is small. It leads steeply downward into the dark ant village. Near the ground surface many of the rooms are filled with seeds gathered from prairie plants. These rooms are granaries. Many ants work here, removing the husks and carrying them out to be thrown away. Kangaroo rats often come at night and dig into the ant hill to steal the grain.

When the ants leave the nest area to gather food, they are in danger. Almost everywhere the ants go, there are enemies to attack them. Not far from the nest area there is a small colony of wolf ants. These are tiny creatures but they are greatly feared by the harvester ants. Harvester ants are frequently attacked and killed by wolf ants.

Another enemy of the harvester ants may be half hidden in the shade of sagebush. This enemy is a "dragon" with a spiny head and plump, scaly body. If the harvester ant strays too near, the "dragon" flicks out its tongue and the ant is gone. This "dragon" is really a horned toad. In some ways it fits the description of the dragons that were supposed to live in the forests near feudal villages long ago.

An astonishing thing about the harvester ant colony is that there is always a great amount of activity. If there is nothing else to be done, the ants dig a new chamber. It can be used later for grain or for laying eggs. The ants dig with their feet like tiny dogs digging out a gopher. Now and then the ants loosen the hard earth with their jaws and kick it back with their feet. Sometimes they even turn on their backs and dig the earth above them. While these busy little miners are digging, other ants carry the loose earth up the surface. They truly seem like busy villagers.

## VILLAGE BENEATH THE PRAIRIE

by Ross E. Hutchins

1. You are likely to see a harvester ant village
  - a. on a prairie
  - b. in a swamp
  - c. on a mountain
2. The eggs laid by the queen harvester ant are looked after by
  - a. the queen ant
  - b. the worker ants
  - c. the wolf ants
3. The "dragon" that catches and eats harvester ants is a
  - a. wolf ant
  - b. kangaroo rat
  - c. horned toad
4. The cone of the harvester ant village is made from
  - a. the husks of seeds
  - b. sand and soil from inside the ant hill
  - c. prairie plants
5. Granaries are places for
  - a. storing food
  - b. laying eggs
  - c. eating meals
6. The imaginary enemies of the feudal villagers were
  - a. wolves
  - b. knights
  - c. dragons
- \* 7. Harvester ant colonies are like feudal villages because
  - a. they have imaginary enemies
  - b. there is a community
  - c. a queen rules
- \* 8. The harvester ants
  - a. use their time well
  - b. enjoy recreation
  - c. rest when the job is finished

Appendix E

ANSWER SHEET FOR  
READING AND LISTENING QUESTIONS



Name \_\_\_\_\_

Circle R when reading  
Circle L when listening

## THE BIG FIRE R or L

1. B    5. B  
 2. A    6. C  
 3. C    7. B  
 4. B    8. A

## GENERAL TOM THUMB R or L

1. B    5. C  
 2. A    6. B  
 3. B    7. A  
 4. A    8. A

## REPTILES OF TODAY

1. B    5. B  
 2. B    6. A  
 3. B    7. A  
 4. C    8. C

## THE AMERICAN GAME

1. B    5. B  
 2. C    6. B  
 3. A    7. C  
 4. C    8. C

SKY BUFFALO AND HIS  
MEDICINE PIPE

1. A    5. C  
 2. C    6. B  
 3. A    7. A  
 4. C    8. A

## VILLAGE BENEATH THE PRAIRIE

1. A    5. A  
 2. B    6. C  
 3. C    7. B  
 4. B    8. A

Do you learn best when you read or listen or both? \_\_\_\_\_

Reading

Literal \_\_\_\_\_

Inferential \_\_\_\_\_

Total \_\_\_\_\_

Listening

Literal \_\_\_\_\_

Inferential \_\_\_\_\_

Total \_\_\_\_\_

Modality Preference \_\_\_\_\_

Appendix F  
MODALITY TEST SCORES

Table A

## Modality Test Scores

ID #	Revised Baxter Test		Ladd Test	
	Visual	Auditory	Visual	Auditory
1.	4.5	5.0	4.4	4.5
2.	3.8	4.0	3.4	3.8
3.	3.6	4.0	3.8	4.0
4.	3.8	5.0	3.9	4.0
5.	3.9	4.0	3.0	4.3
6.	3.8	5.0	4.8	5.0
7.	4.0	4.5	4.7	4.9
8.	3.6	4.0	0.9	4.6
9.	4.6	5.0	3.6	3.8
10.	3.8	5.0	4.4	4.7
11.	4.8	3.0	5.0	4.7
12.	4.9	4.0	4.8	2.1
13.	4.1	2.0	5.0	4.2
14.	4.6	4.0	5.0	3.7
15.	2.1	2.0	4.7	3.7
16.	4.6	4.0	4.6	4.0
17.	4.8	4.0	5.0	3.1
18.	4.5	3.0	4.6	4.5
19.	3.6	3.5	4.1	2.9
20.	4.8	4.0	4.4	3.0
21.	4.5	3.0	4.8	2.7
22.	4.9	1.0	4.8	3.3

Table A (con't)

## Modality Test Scores

ID #	Revised Baxter Test		Ladd Test	
	Visual	Auditory	Visual	Auditory
23.	4.5	1.0	4.8	4.2
24.	5.0	3.5	4.8	3.4
25.	5.0	3.0	4.8	2.0
26.	3.0	4.0	5.0	3.5
27.	4.8	3.0	5.0	4.0
28.	4.7	3.0	4.7	3.2
29.	4.9	4.0	4.4	2.5
30.	5.0	3.0	5.0	4.6
31.	4.5	4.0	4.8	2.8
32.	5.0	4.0	4.8	4.0
33.	5.0	5.0	5.0	4.0
34.	4.5	5.0	5.0	3.8
35.	4.0	4.0	4.8	3.9
36.	4.8	5.0	4.8	4.1
37.	4.7	4.0	4.0	4.7
38.	4.0	5.0	4.6	4.1
39.	5.0	4.0	4.2	4.4
40.	4.7	5.0	4.6	3.9
41.	5.0	5.0	4.6	4.7
42.	1.4	1.5	4.0	3.0
43.	4.8	4.0	4.3	4.4
44.	2.5	3.0	4.4	3.0



Table A (con't)

## Modality Test Scores

ID #	Revised Baxter Test		Ladd Test	
	Visual	Auditory	Visual	Auditory
45.	2.5	4.3	5.0	5.0
46.	4.5	4.5	5.0	3.0
47.	2.6	4.0	4.1	3.6
48.	4.0	5.0	5.0	3.5
49.	4.9	4.0	3.0	4.4
50.	4.5	5.0	4.7	2.3
51.	5.0	4.0	2.0	3.6
52.	3.6	5.0	4.8	4.1
53.	3.6	5.0	5.0	3.2

**Appendix G**

**RAW SCORES FROM READING AND LISTENING TASKS**

Table B  
Auditory Learners' Scores

ID. #	Literal Questions		Inferential Questions		Total	
	Read	Listen	Read	Listen	Read	Listen
1.	09	12	09	11	18	23
2.	11	12	10	11	21	23
3.	06	10	08	09	14	19
4.	08	11	08	10	16	21
5.	10	10	11	09	21	19
6.	06	09	08	08	14	17
7.	11	11	11	12	22	23
8.	05	09	10	08	15	17
9.	04	10	07	10	11	20
10.	10	07	07	07	17	14

Table C

## Visual Learners' Scores

ID #	Literal Questions		Inferential Questions		Total	
	Read	Listen	Read	Listen	Read	Listen
11.	10	10	09	09	19	19
12.	11	10	07	08	18	18
13.	07	07	10	06	17	13
14.	08	09	12	08	20	17
15.	09	11	11	10	20	21
16.	08	10	07	11	15	21
17.	08	05	07	07	15	12
18.	10	09	09	12	19	21
19.	11	10	10	10	21	20
20.	08	11	09	08	17	19
21.	09	11	08	09	17	20
22.	09	11	10	09	19	20
23.	08	11	10	10	18	21
24.	09	08	10	07	19	15
25.	10	10	08	09	18	19
26.	09	10	10	08	19	18
27.	07	11	08	09	15	20
28.	07	11	08	10	15	21
29.	11	10	11	11	22	21
30.	08	09	09	09	17	18
31.	08	11	06	11	14	22
32.	10	10	10	09	20	19



Table D  
Combination Auditory-Visual Learners' Scores

ID #	Literal Questions		Inferential Questions		Total	
	Read	Listen	Read	Listen	Read	Listen
33.	12	12	10	08	22	20
34.	11	07	07	11	18	18
35.	06	08	08	10	14	18
36.	10	11	06	07	16	18
37.	08	09	09	07	17	16
38.	08	11	10	06	18	17
39.	10	10	10	09	20	19
40.	11	09	09	09	20	18
41.	11	10	11	09	22	19
42.	10	10	10	11	20	21
43.	07	12	09	10	16	22

Table E  
No Preference Learners' Scores

ID #	Literal Questions		Inferential Questions		Total	
	Read	Listen	Read	Listen	Read	Listen
44.	08	08	10	07	18	15
45.	12	12	10	10	22	22
46.	11	11	10	11	21	22
47.	07	08	07	08	14	16
48.	11	09	11	11	22	20
49.	08	11	09	08	17	19
50.	08	08	10	05	18	13
51.	11	12	10	10	21	22
52.	04	07	08	07	12	14
53.	12	11	12	11	24	22